The DOE 6-Laboratory View of the Future of Nuclear Power

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[http://nuclear.inel.gov/papers-presentations/DOE_6-laboratory_overview.pdf]

ANS Special Plenary Session on
"The MIT Report on the Future of Nuclear Power in the US: Review and Discussions"
November 18, 2003

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Summary of the 6-Laboratory Activity

- July 2002 Letter to the Secretary of Energy
  - Urge Implementation of a Comprehensive and Integrated Plan to Further the Development of Nuclear Energy and the Management of Nuclear Materials
  - Emphasize the Importance of US Leadership
- December 2002 Charge From Bill Magwood to Build an Action Plan
- April 2003 Laboratory Directors Propose Four Near-term Actions.

  Incentives for Near-term Deployment of New Nuclear Power Plants
  - Develop and Demonstrate Generation IV Technology For Electricity and Hydrogen Production
  - Develop and Demonstrate Closed Fuel Cycle Technology
  - Develop and Demonstrate Technology to Set a New World Standard for Proliferation Prevention

  [http://nuclear.inel.gov/papers-presentations/6-lab-exec-sum.pdf]

  [http://nuclear.inel.gov/papers-presentations/power_for_the_21st_century.pdf]

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Nuclear Energy Must Grow Substantially in the 21st Century in Order to make Important Contributions to our Energy Security and Environmental Quality

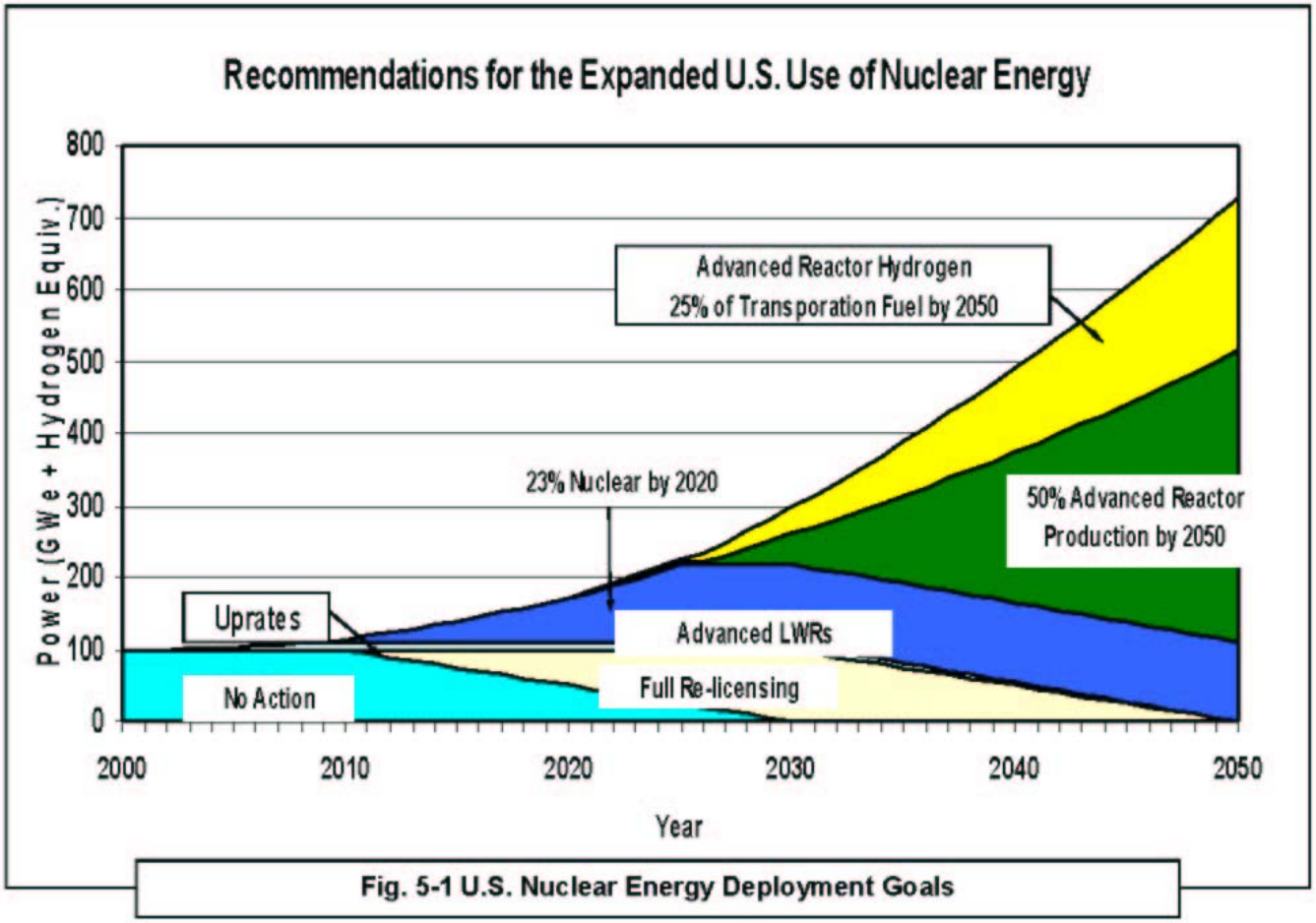

Fig. 5-1 U.S. Nuclear Energy Deployment Goals

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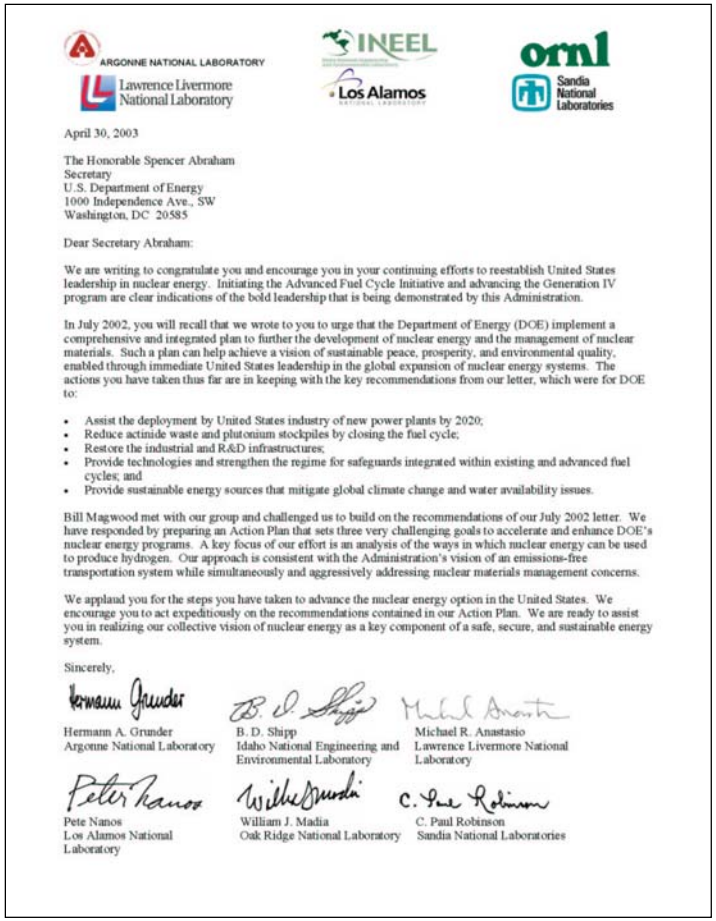
DOE Laboratory Directors Recommendations to Place the U.S. on a Path to Nuclear Energy Growth

- Provide significant incentives to enable industry to place at least one new nuclear plant order by 2008
- Develop and demonstrate Advanced Generation IV Reactor Systems that can support a major expansion of nuclear energy in the first half of the 21st century
  - High-Temperature Hydrogen Production Demonstrations (non-nuclear) by 2006
  - Build a High-Temperature, Gas-Cooled Reactor to demonstrate high efficiency electricity and hydrogen production by 2010-12
  - Build a Fast-Spectrum reactor for electricity production and nuclear materials management by 2020
- Cooperatively develop internationally-deployable Advanced Reactor and Fuel Cycle Systems to enable 10-15% of world energy to be produced by nuclear energy in 2050



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April 30, 2003

The Honorable Spencer Abraham
Secretary
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

Dear Secretary Abraham:

We are writing to congratulate you and encourage you in your continuing efforts to reestablish United States leadership in nuclear energy. Initiating the Advanced Fuel Cycle Initiative and advancing the Generation IV program are clear indications of the bold leadership that is being demonstrated by this Administration.

In July 2002, you will recall that we wrote to you to urge that the Department of Energy (DOE) implement a comprehensive and integrated plan to further the development of nuclear energy and the management of nuclear materials. Such a plan can help achieve a vision of sustainable peace, prosperity, and environmental quality, enabled through immediate United States leadership in the global expansion of nuclear energy systems. The actions you have taken thus far are in keeping with the key recommendations from our letter, which were for DOE to:

- Assist the deployment by United States industry of new power plants by 2020;
- Reduce actinide waste and plutonium stockpiles by closing the fuel cycle;
- Restore the industrial and R&D infrastructures;
- Provide technologies and strengthen the regime for safeguards integrated within existing and advanced fuel cycles; and
- Provide sustainable energy sources that mitigate global climate change and water availability issues.

Bill Magwood met with our group and challenged us to build on the recommendations of our July 2002 letter. We have responded by preparing an Action Plan that sets three very challenging goals to accelerate and enhance DOE's nuclear energy programs. A key focus of our effort is an analysis of the ways in which nuclear energy can be used to produce hydrogen. Our approach is consistent with the Administration's vision of an emissions-free transportation system while simultaneously and aggressively addressing nuclear materials management concerns.

We applaud you for the steps you have taken to advance the nuclear energy option in the United States. We encourage you to act expeditiously on the recommendations contained in our Action Plan. We are ready to assist you in realizing our collective vision of nuclear energy as a key component of a safe, secure, and sustainable energy system.

Sincerely,

Hermann A. Grunder, Argonne National Laboratory
B. D. Shipp, Idaho National Engineering and Environmental Laboratory
Michael R. Anastasio, Lawrence Livermore National Laboratory
Pete Nanos, Los Alamos National Laboratory
William J. Madia, Oak Ridge National Laboratory
C. Paul Robinson, Sandia National Laboratories

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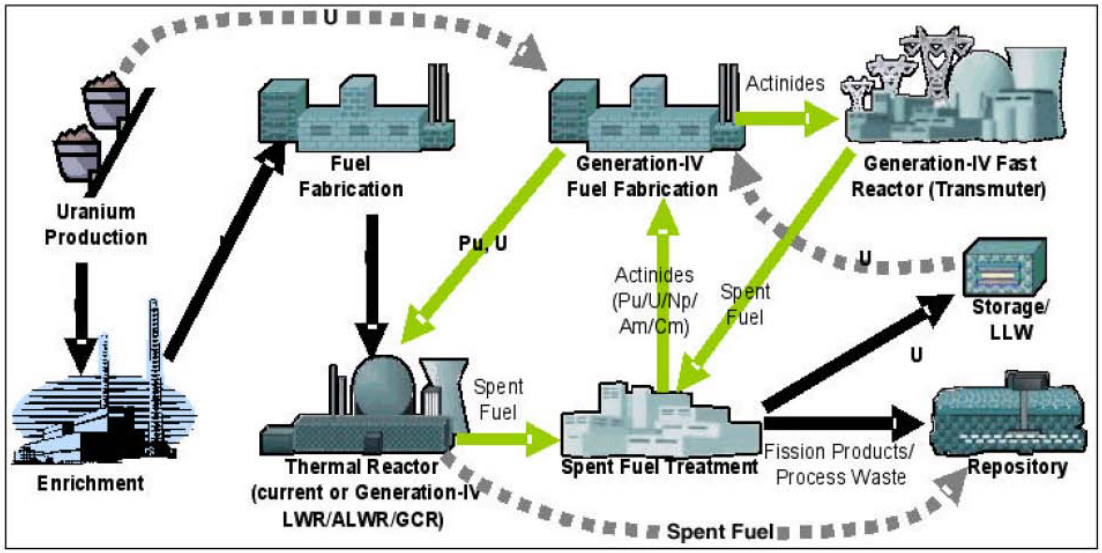
Advanced Closed Fuel Cycle Technology - The Economically, Socially, and Politically Sustainable Fuel Cycle of the Future

- Advanced Separation Technology, Under International Safeguards, Can Address Proliferation Concerns
- Burnup/Transmutation of Plutonium & Actinides
- Substantially Reduced Radiotoxicity and Lifetime of Geologically-Disposed Waste
- Eliminate the Technical Need for a Second Repository in this Century
- Sustain Nuclear Fuel Supplies for Centuries



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A New Regime for Global Nuclear Materials Management

- Analytical Methodology and Standards for Quantifying Proliferation Risk
- Advanced Fuels, Sensors, Monitoring and Transparency Systems
- International Framework with Increased Authority for Oversight and Enforcement
- International Fuel Cycle Centers Provide Global Management of Nuclear Materials, including Enrichment, Spent Fuel Separations and Reprocessing, and Waste Management

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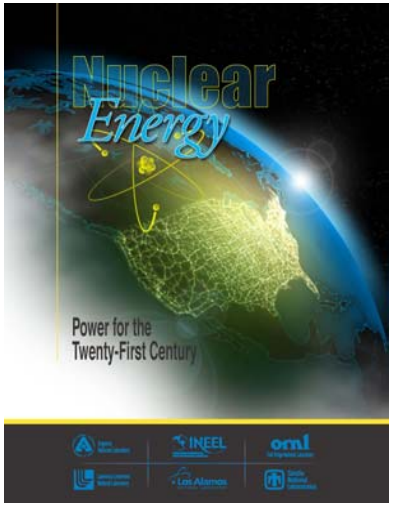
6-Laboratory and MIT Recommendations Agree in Several Major Aspects

- The Need for Substantial Growth in Worldwide Nuclear Energy For Security and Environmental Quality Reasons
- Economic, Safety, Waste Management, and Proliferation Resistance Challenges (The Generation IV Drivers)
- The Need for Government Support for Near-Term Construction, as Well as Long-Term Research, Development and Demonstration of Advanced technology
- The Need for Environmental Equity Among All Energy Sources
- Promising Potential of High-Temperature, Gas-Cooled Reactors
- The Need for Fuel Cycle Research & Development



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But . . . The Laboratory Directors Remain Unconvinced By The MIT Report Analysis About How to Enable The Desired Future For Nuclear Energy

- MIT Economic Analysis for New Reactor Construction and Fuel Recycle is at Odds with Other Expert Estimates
- National Security Drivers for a Closed Fuel Cycle are Ignored
- Social/Political Unacceptability of Multiple Repositories in the US Motivates a Higher Priority for Closed Fuel Cycle Research, Development and Demonstration
- The MIT Recommendation to "Drop Work" on Advanced Reactors is Inconsistent with the Stated Goals for Nuclear Energy in the 21st Century
- The Laboratory Directors See a Much Greater Urgency for Action

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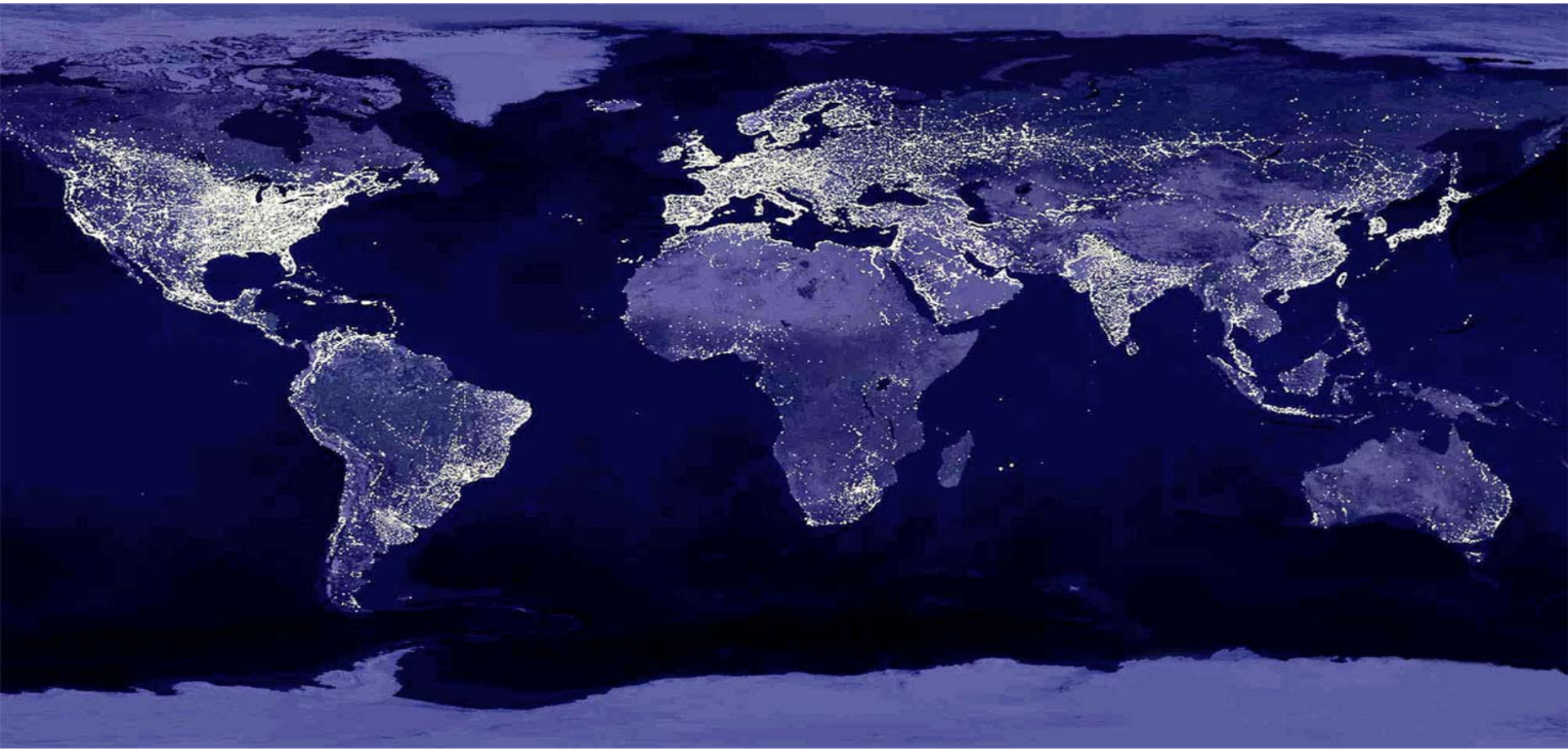
Conclusions

- The MIT Report Has Provided a Valuable Vehicle to Raise the Level of Dialog About the Future of Nuclear Energy

- That Dialog is Producing an Emerging Consensus on Several Major Actions That Can Enable the Desired Future, Characterized by Growing World Prosperity Derived From Abundant, Affordable and Secure Energy Supplies, and a Cleaner Environment with Nuclear Energy

  – This is a Desirable Legacy of US Energy Leadership

Nuclear Energy Has An Opportunity To Contribute To a More Secure and Prosperous Tomorrow



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